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New Bus For London

Briefing Report for DfT, VOSA & VCA on NBfL Operation and Certification

14th Jan 2010

A NEW BUS FOR LONDON

NEW BUS FOR LONDON
Briefing paper for DfT/VCA/VOSA
Outline operational practices & certification issues

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1. Overview of Bus Configuration

1.1. The NBFL vehicle is an 11m double deck equipped with two staircases and three apertures. As indicated on the general arrangement drawing below.

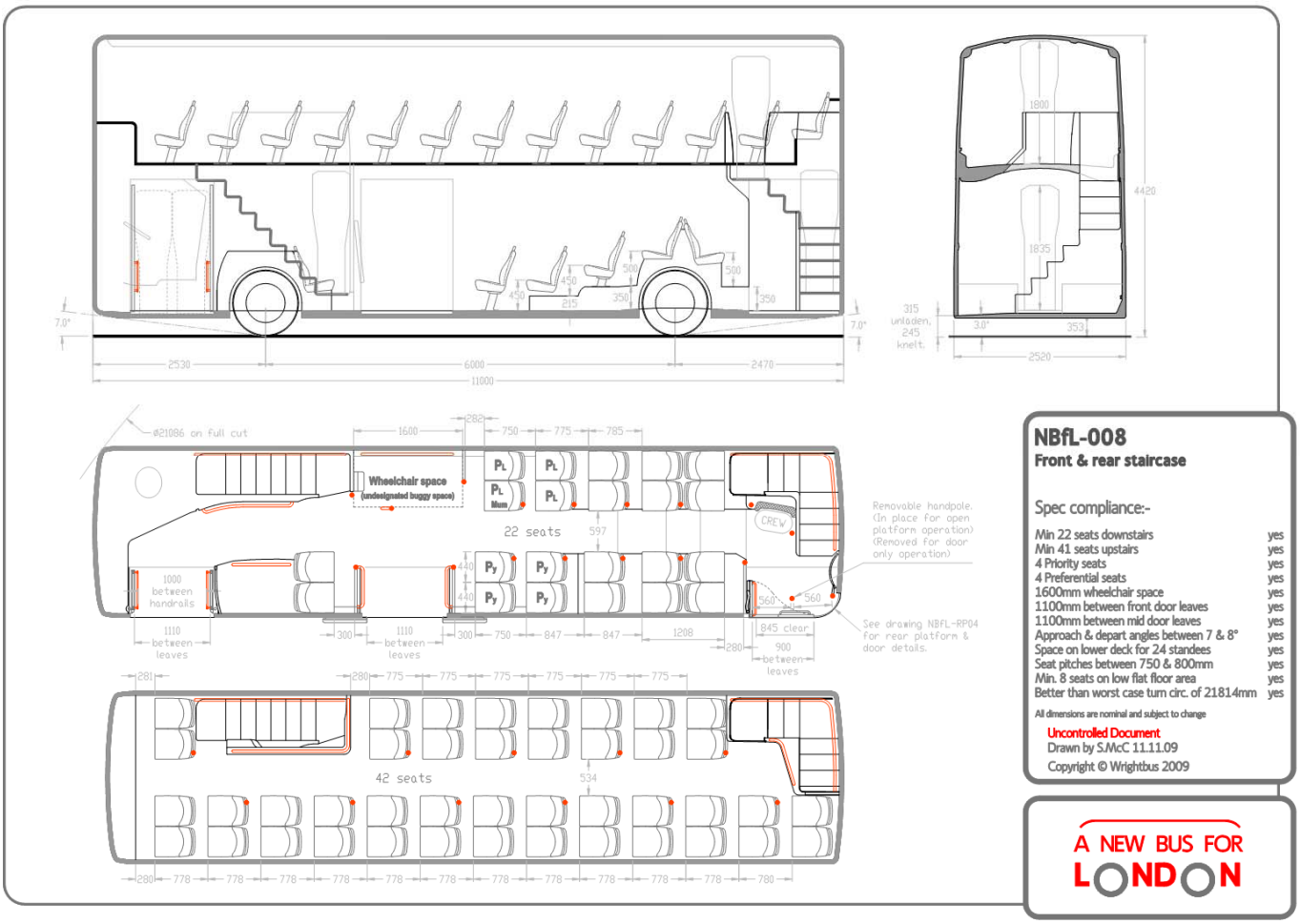

NBfL-008
Front & rear staircase
Spec compliance:-
Min 22 seats downstairs yes
Min 41 seats upstairs yes
4 Priority seats yes
4 Preferential seats yes
1600mm wheelchair space yes
1100mm between front door leaves yes
1100mm between mid door leaves yes
Approach & depart angles between 7 & 8° yes
Space on lower deck for 24 standees yes
Seat pitches between 750 & 800mm yes
Min. 8 seats on low flat floor area yes
Better than worst case turn circ. of 21814mm yes
All dimensions are nominal and subject to change
Uncontrolled Document
Drawn by S.McC 11.11.09
Copyright © Wrightbus 2009
Wheelchair space
(undesignated buggy space)
22 seats
42 seats
Removable handpole. (In place for open platform operation) (Removed for door only operation)
See drawing NBfL-RP04 for rear platform & door details.
A NEW BUS FOR LONDON

Figure 1 - General Arrangement Drawing of NBfL

1.2. The front and centre apertures shall be power operated services doors.

1.3. The third aperture shall be equipped so that it can be configured to operate in two different modes. Stowable bodywork will allow the vehicle to be configured as either an open platform or as a third service door, dependant upon operational requirements. The current design of the stowable bodywork is indicated in the following drawings.

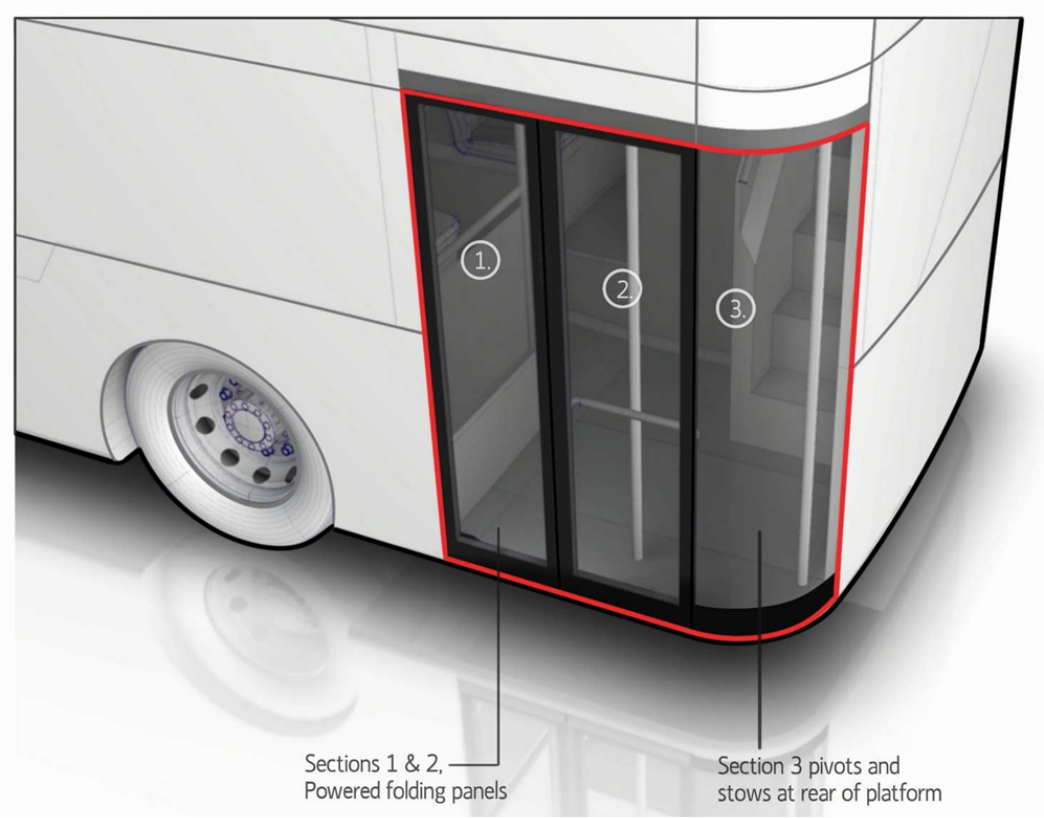


Figure 2 - General Arrangement of Third Aperature

Sections 1 and 2, shown in blue on figure 3, shall be a power operated, bi-folding glass panels. This is the section of the stowable bodywork which will operate a service door.

Section 3, shown in magenta in Figure 3, is a hinged panel which is either locked in the open or closed position.

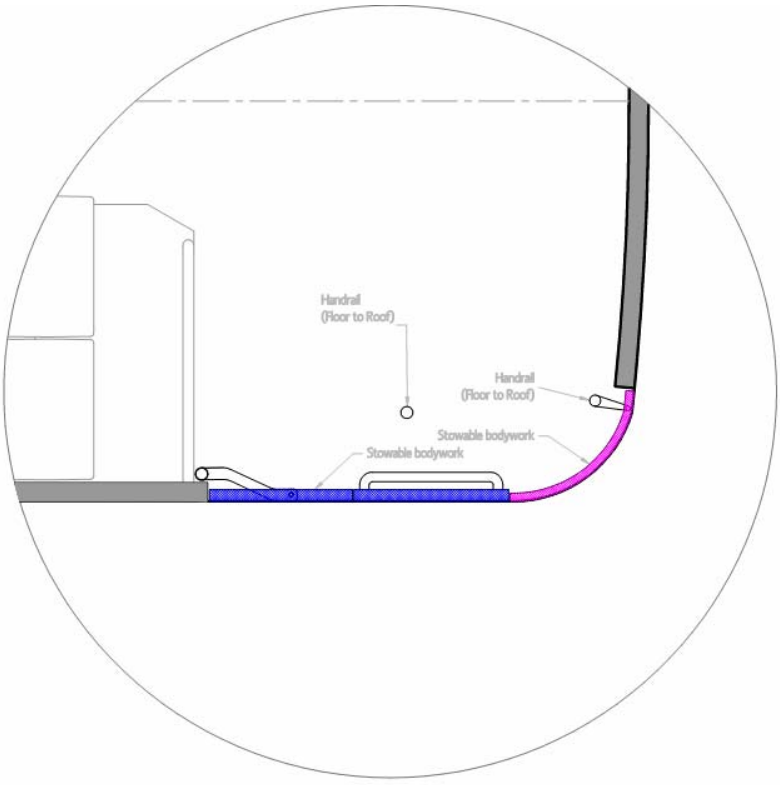


Figure 3 - Stowable Bodywork viewed from above

2. Bus operation in open platform mode with conductor

2.1. It is intended that the bus will operate with a driver and conductor (crewed mode) during the busy peak daytime periods Monday to Friday. The bus will at all times have three apertures at which passengers can board and alight under the open boarding principle: the front and centre apertures will be power operated service doors (dual leaf with 1100mm clear width), and the third aperture will be the open platform.

2.2. During these periods and only when a conductor is present, the rear open platform will be set in the "locked open" configuration with the front and rear panels of the stowable bodywork locked in their stowed positions. In this configuration driver control of the powered front folding door panels is disabled.

2.3. The front and centre entrances/exits will be controlled by the driver as "powered service doors".

2.4. Passengers will be able to board and alight at any of the three entrances. Fare validation for pre-pay cards will be by means of card readers at all three entrances.

2.5. The conductor's primary role will be to supervise the boarding and alighting of passengers at the rear platform.

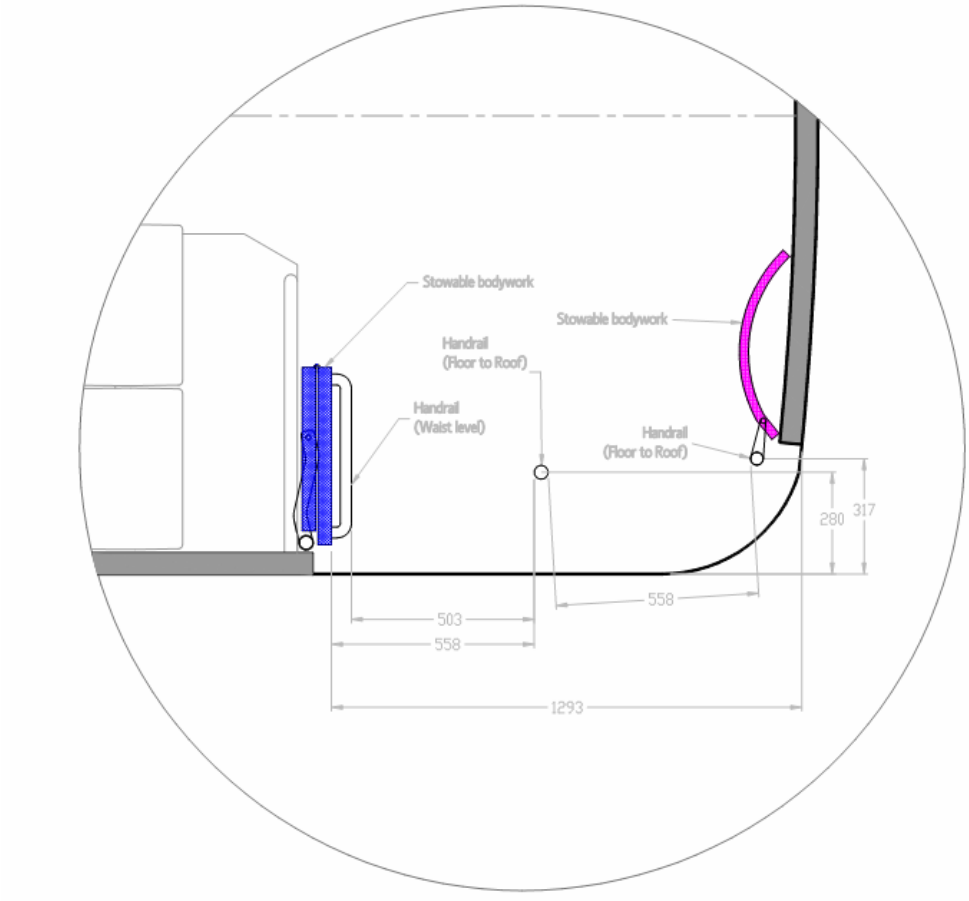


Figure 4 – Plan View in Open Rear Platform Configuration

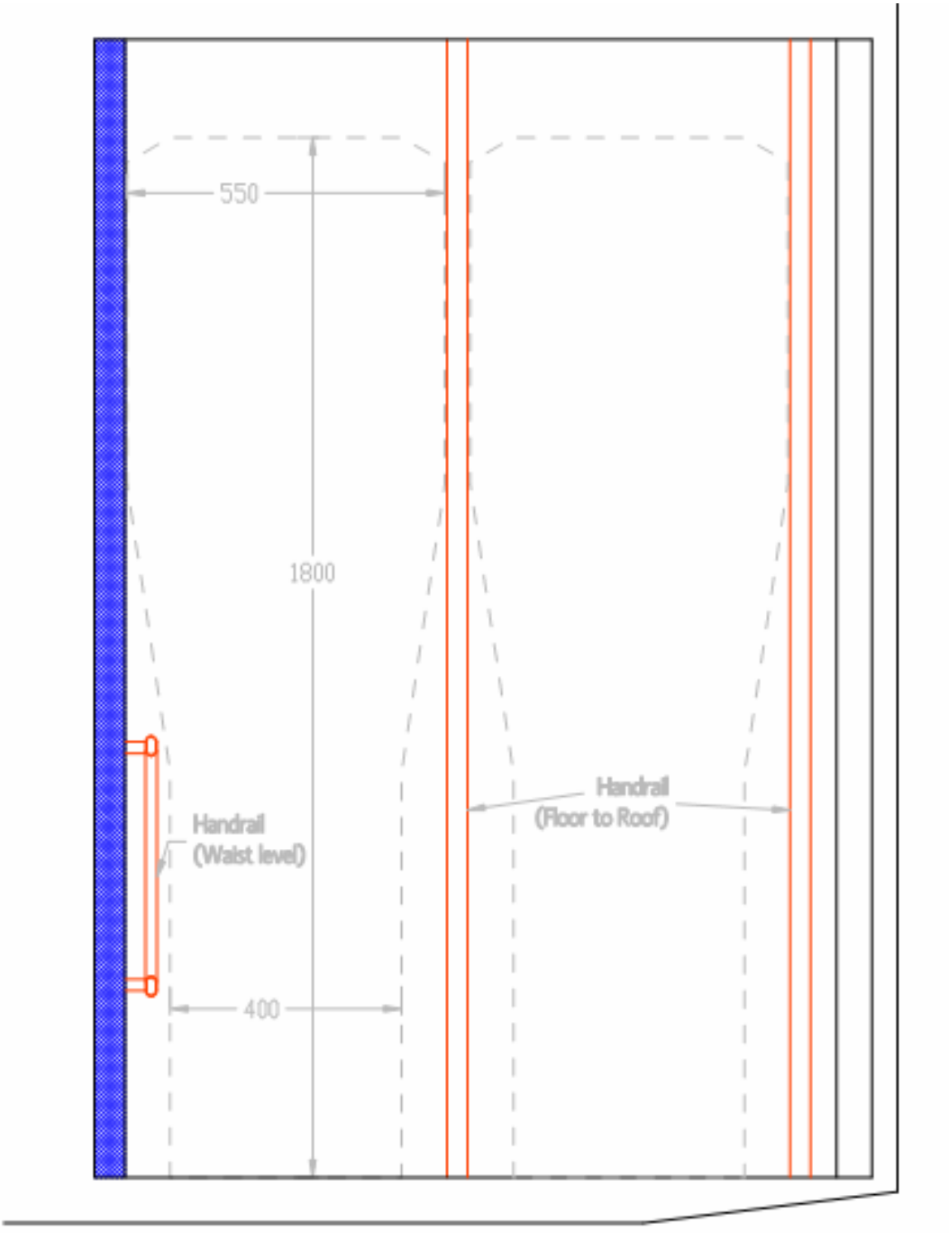


Figure 5 - Side Elevation in Open Rear Platform Configuration

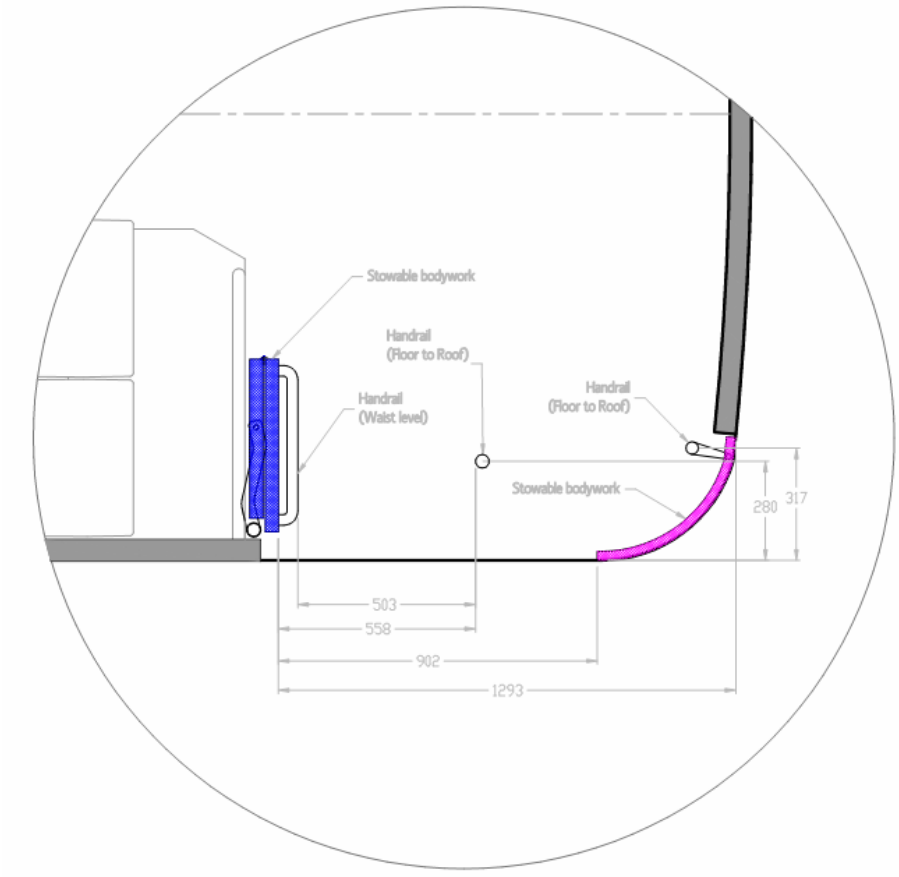
3. Bus operations in driver-only mode

3.1. Outside of peak daytime periods it is intended that the bus will operate in driver-only mode (otherwise known as one person operation – OPO). The bus will at all times have three apertures at which passengers can board and alight under the open boarding principle: the front and centre apertures will be power operated service doors (dual leaf with 1100mm clear width), and the third aperture will be a power operated service door – the clear opening width can be seen in figure 6 and 7.

3.2. During these periods the door panels and stowable bodywork to the rear platform will have been manually re-configured into the “closed” position. This requires the rear curved panel to be brought out from its stowed position and locked into its “closed” position, and for the front folding door panels to be unlocked from their stowed position and for power and control systems to be restored to them. In this configuration the driver is able to initiate the opening and closing sequence of all the doors in unison or individual doors as the situation requires.

3.3. Passengers will be able to board and alight at any of the three entrances. Fare validation for pre-pay cards will be my means of card readers at all three entrances.

3.4. The driver will be responsible for opening and closing doors and for determining when to pull away from a bus stop. Visual monitoring of the centre door and rear platform door will be provided to the driver via CCTV.



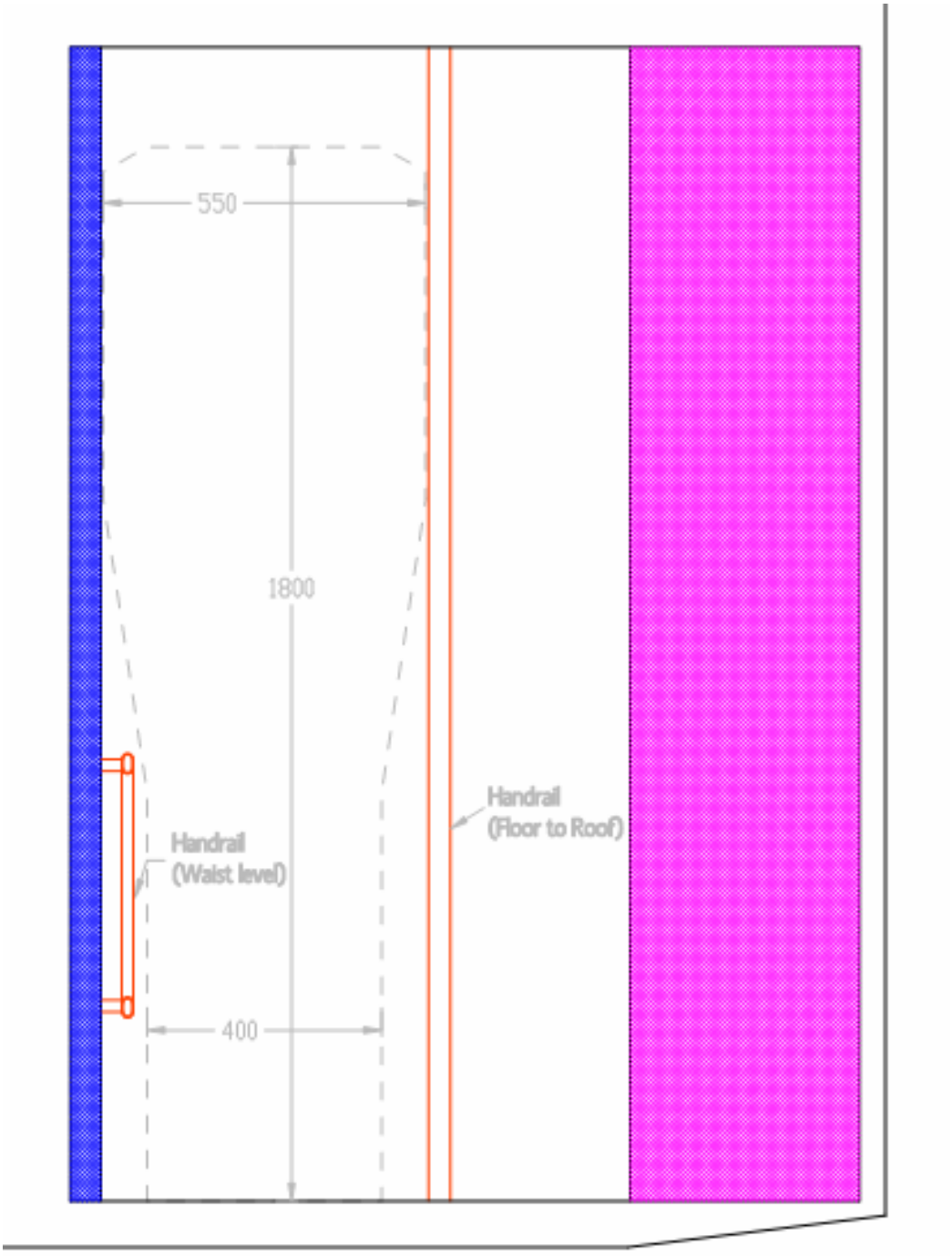


Figure 7 - Side Elevation Configured as Third Service Door

4. Changeover from one mode to another

4.1. To Change from Rear Platform Mode to a Third Service Door.

Step 1 – Unlock curved panel from stowed position. This operation will require a special key or tool.

Step 2 – Hinge curved panel outwards to close off rear portion of the platform

Step 3 – Using special tool or key lock curved glass panel in the deployed position.

Step 4 – The power operated panels will currently be locked in the stowed position. A key operated electrical switch will disable the signal that keeps the door locked in the open position and enable the door to be operated from the drivers cab.

4.2. To Change from to a Third Service Door Operation to Rear Platform Mode.

Step 1 – The power operated panels will currently controlled from the drivers cab. A key operated electrical switch will disable the drivers control to the door, and apply a signal to lock the door in the open position.

Step 2 - Unlock curved panel from deployed position. This operation will require a special key or tool.

Step 3 – Hinge curved panel inwards open the rear portion of the platform

Step 4 – Using special tool or key lock curved glass panel in the stowed position.

Appendix A

Wrightbus Interpretation of Regulations

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NBfL

Rear Platform – Information For DfT, VCA, VOSA

Further to our meeting on Monday 11th January 2010, please find below and overleaf extracts from ECE Regulation 107 and Wrightbus' response to how the 2 modes of operation proposed for the New Bus For London project are interpreted by Wrightbus.

For the purpose of the document, the two modes will be referred to as ;

'Open Platform' means the mode of operation where the rear platform is completely open and the door that is locked in the open position is classed as a manually operated double service door.

'Powered Door' means the mode of operation where the rearmost service door on the vehicle is a single power operated service door arrangement under the control of the driver.

The vehicle will be built to the requirements of ECWVTA or NSSTA and will be category M3 and Class I.

ECE Regulation 107 Rev 2 (consolidated to 02 series of amendments)

Extracts

2. **Definitions ;**

2.5 **"Service Door" means a door intended for use by passengers in normal circumstances with the driver seated**

2.6 **"Double Door" means a door affording two, or the equivalent of two, access passages**

2.25 **"Power Operated Service Door" means a service door which is operated exclusively by energy rather than muscular energy and the opening and closing of which, if not automatically operated, is remotely controlled by the driver or a member of the crew**

Wrightbus Comment : In the two modes of operation, the 'Rear Service Door' mode will comply with the aforementioned definition for 'Power Operated Service Door'. It will meet the requirements for a single door. The Open Platform could be seen to comply with the definition of a 'Service Door' as the arrangement could be seen to

include a door, albeit it one that remains open, with it manually moved into this position prior to it being locked with the aid of tools. The dimensions will comply with the requirements for a double door

7.6.4. Technical Requirements for All Service Doors

7.6.4.1. Every service door shall be capable of being easily opened from inside and from outside the vehicle when the vehicle is stationary (but not necessarily when the vehicle is moving). However, this requirement shall not be construed as precluding the possibility of locking the door from the outside, providing the door can always be opened from the inside.

Wrightbus Comments ;

Open Platform – Complies, as the 'manual service door' will be in the locked open position.

Powered Door – Complies, as the vehicle will be fitted with interior and exterior emergency open buttons to be used when this mode is used.

7.6.4.2. Every control or device for opening a door from the outside shall be between 1000mm and 1500mm from the ground and not more than 500mm from the door. In vehicles of class I, II and III every control or device for opening a door from the inside shall be between 1000mm and 1500mm from the upper surface of the floor or step nearest the control and be not more than 500mm from the door. This shall not apply to controls located in the driver's area

Wrightbus Comments ;

Open Platform – Complies. As the 'service door' mode will be manually operated it will not have opening controls.

Powered Door – Complies, as the vehicle will be fitted with the said controls in the compliant positions as required.

7.6.4.3. Every one-piece manually operated service door which is hinged or pivoted shall be so hinged or pivoted that if the open door comes into contact with a stationary object which the vehicle is moving forwards it tends to close.

Wrightbus Comments ;

Open Platform – Complies, as the 'manual service door' will be locked in the open position it is not possible for it to come into contact with a stationary object during normal circumstances.

Powered Door – This paragraph is not applicable to the powered service door arrangement.

7.6.4.4. If a manually operated service door is fitted with a slam lock it shall be of the two stage type

Wrightbus Comments ;

Open Platform – Complies, as the 'service door' mode will be locked in the open position it will not be fitted with a slam lock.

Powered Door – This paragraph is not applicable to the powered service door arrangement.

7.6.4.5. **On the inside of a service door there shall not be any device intended to cover the inside steps when the door is closed. This does not exclude the presence in the step well, when the door is closed , of the door operating mechanism and other equipment attached to the inside of the door which does not form an extension of the floor on which passengers may stand. The mechanism and equipment should not be dangerous for the passengers**

Wrightbus Comments ;

Open Platform – Complies, as there will not be any device to cover the inside steps.

Powered Door – Complies, as there will not be any device to cover the inside steps.

7.6.4.5. **If the direct view is not adequate, optical or other devices shall be installed to enable the driver to detect from his seat the presence of a passenger in the immediate interior and exterior vicinity of every side service door which is not an automatically operated service door.**

In the case of double deck vehicles of Class I, this requirement also applies to the interior of all service doors and to the immediate vicinity of each communication staircase on the upper deck.

~~In the case of a service door in the rear face of the vehicle~~ <u>not exceeding 22 passengers</u>~~, this requirement is satisfied if the driver is able to detect the presence of a person 1.3m tall standing 1m behind the vehicle~~

Driving mirrors may be used to meet the requirements of this paragraph provided that the field of view required for driving is still met.

~~In the case of doors situated behind the articulated section of an articulated vehicle, mirrors shall not be deemed to be a sufficient optical device.~~

Wrightbus Comments ;

Open Platform – Complies. It is planned that cameras will be used to meet this requirement.

Powered Door – Complies. It is planned that cameras will be used to meet this requirement.

7.6.4.7. **Every door which opens towards the interior of the vehicle and its mechanism shall be so constructed that its movement is not likely to cause injury to passengers in normal conditions of use. Where necessary, appropriate protection devices shall be fitted.**

Wrightbus Comments ;

Open Platform – Complies. The 'manual service door' will open towards the interior of the vehicle but this function will be performed by driver or crew outside normal conditions of use therefore no injury to passengers from the movement is possible.

Powered Door – Complies. The powered service door movement will be fitted with safety devices to prevent injury to passengers from its movement and mechanism.

7.6.4.8. ***If a service door is located adjacent to a door to a toilet or other internal compartment the service door shall be proofed against unintentional operation. However, this requirement shall not apply if the door is locked automatically when the vehicle is moving at a speed exceeding 5km/h***

Wrightbus Comments ;

Open Platform – This paragraph is not applicable as the 'manual service door' will not be adjacent to a door to a toilet or other internal compartment.

Powered Door – Complies. The powered service door movement will be fitted with safety devices to prevent injury to passengers from its movement and mechanism.

7.6.4.9. ~~**In the case of vehicles having a capacity not exceeding 22 passengers, the service doors of which are in the rear face of the vehicle, the leaves shall not be capable of being opened more than 115° nor less than 85° and when open, shall be capable of being held automatically in that position. This does not preclude the ability to override that stop and open the door beyond that angle when it is safe to do so; for example, to enable reversing against a high platform for loading or to open the doors through 270° to allow a clear loading area behind the vehicle.**~~

7.6.4.10 **The service door in any open position shall not obstruct the use of, or required access to, any mandatory exit.**

Wrightbus Comments ;

Open Platform – Complies. The open platform is not required for the product to meet the required number of mandatory exits, either as a service door or an emergency exit so this paragraph does not apply.

Powered Door – Complies. The rear powered service door mode is not required for the product to meet the required number of mandatory exits, either as a service door or an emergency exit so this paragraph does not apply.

7.6.5. **Additional Technical Requirements For Power Operated Service Doors**

7.6.5.1. **In the event of an emergency, every power operated service door shall be capable, when the vehicle is stationary or driving at a speed less than equal to 5km/h, of being opened from inside and, when not locked, from outside by controls which, whether or not the power supply is operating ;**

7.6.5.1.1. Override all other door controls;

7.6.5.1.2. In the case of interior controls, are placed on, or within 300mm of, the door, at a height (except in the case of interior controls for the door referred to in Annex 8, Paragraph 3.9.1) of not less than 1600mm above the first step;

7.6.5.1.3. Can be easily seen and clearly identified when approaching the door and when standing in front of the door and, if additional to the normal operating controls, be clearly marked for emergency use;

7.6.5.1.4. Can be operated by one person when standing immediately in front of the door;

7.6.5.1.5. Cause the door to open to a width that the gauge as defined in paragraph 7.7.1.1. can pass through within 8 seconds after the operation of the control, or enable the door to be easily opened by hand to a width that the gauge as defined in paragraph 7.7.1.1. can pass through within 8 seconds after the operation of the control;

7.6.5.1.6. May be protected by a device which can be easily removed or broken to gain access to the emergency control; the operation of the emergency control, or the removal of a protective cover over the control, shall be indicated to the driver both audibly and visually, and;

7.6.5.1.7. In the case of a driver operated door which does not comply with the requirements of paragraph 7.6.5.6.2, shall be such that after they have been operated to open the door and returned to their normal position, the door will not close again until the driver subsequently operates a closing control.

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position.

Powered Door – Complies. The rear powered service door mode will have the necessary controls and features to permit the requirements of 7.6.5.1 – 7.6.5.1.7 to be achieved.

7.6.5.1.8. The doors shall be prevented from opening if the vehicle moves at a speed higher than 5km/h

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position. <u>This being the case the Regulation appears to permit a manually operated service door(s) to remain open above 5km/h.</u>

Powered Door – Complies. The rear powered service door mode will have the necessary interlocks to ensure that the vehicle cannot be driven above 5km/h unless the door is closed.

7.6.5.2. A device may be provided which is operated by the driver from the driving seat to deactivate the outside emergency controls in order the lock the service

doors from the outside. In this case, the outside emergency controls shall be reactivated automatically either by the starting of the engine or before the vehicle reaches a speed of 20km/h. Subsequently, deactivation of the outside emergency controls shall not occur automatically but shall require a further action by the driver.

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position.

Powered Door – Not applicable as it is not the intention of the manufacturer or operator to fit a device of this type.

7.6.5.3. Every driver operated service door shall be capable of operation by the driver when in the driving seat using controls which, except in the case of a foot control, are clearly and distinctively marked

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position.

Powered Door – Complies. All controls shall be capable of operation by the driver whilst in his seat and will be marked as required.

7.6.5.4. Every power operated service door shall illuminate a visual tell tale, which shall be plainly visible to the driver when seated in his normal driving position in any normal ambient lighting condition, to warn that a door is not fully closed. This tell tale shall signal whenever the rigid structure of the door is between the fully open position and a point 30mm from the fully closed position. One tell-tale shall be fitted in respect of a front service door which does not comply with the requirements of paragraphs 7.6.5.6.1.1. and 7.6.5.6.1.2

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position. Manufacturer may fit warning light to indicate to the driver that the rear platform is in the 'open' mode.

Powered Door – Complies. All necessary tell tales will be fitted to comply.

7.6.5.5. Where controls are provided for the driver to open and close a power operated service door, they shall be such that the driver is able to reverse the movement of the door at any time during the closing or opening process

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position.

Powered Door – Complies. The system will operate as documented.

7.6.5.6. The construction and control system of every power operated service door shall be such that a passenger is unlikely to be injured by the door or trapped in the door as it closes.

7.6.5.6.1. This requirement shall be considered satisfied if the following two requirements are met:

7.6.5.6.1.1. The first requirement is that when the closing of the door at any measuring point described in Annex 6 is resisted by a clamping force not exceeding 150N, the door shall reopen automatically to its fullest extent and, except in the case of an automatically operated service door, remain open until a closing control is operated. The clamping force may be measured by any method to the satisfaction of the competent authority. Guidelines are given in Annex 6 to this regulation. The peak force may be higher than 150N for a short time provided that it does not exceed 300N. The reopening system may be checked by means of a test bar having a section of height 60mm, width 30mm with corners radiused to 5mm.

7.6.5.6.1.2. The second requirement is that whenever the doors are closed onto the wrist or fingers of a passenger:

7.6.5.6.1.2.1. The door reopens automatically to its fullest extent and, except in the case of an automatically operated service door, remains open until a closing control is operated, or

7.6.5.6.1.2.2. **The wrist or fingers can be readily extracted from the doors without risk of injury to the passenger. This requirement may be checked by hand, or by means of the test bar mentioned in 7.6.5.6.1.1, tapered at one end over a length of 300mm from a thickness of 30mm to a thickness of 5mm. It shall not be treated with polish nor lubricated. If the door traps the bar it shall be capable of being easily removed, or**

7.6.5.6.1.2.3. The door is maintained at a position allowing the free passage of a test bar having a section of height 60mm, width 20mm, with corners radiused to 5mm. This position shall not be more than 30mm distant from the fully closed position.

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position.

Powered Door – Complies. As with the centre door arrangement on current vehicles supplied to London, the leading edge of the door will be fitted with sensitive edging to permit the door to reopen if it is prevented from closing at the forces noted.

~~**7.6.5.6.2. In the case of a front service door the requirement of paragraph 7.6.5.6. shall be considered satisfied if:**~~

~~**7.6.5.6.2.1. Fulfils the requirements of paragraphs 7.6.5.6.1.1. and 7.6.5.6.1.2, or**~~

~~***7.6.5.6.2.2.*** **Is fitted with soft edges; these shall not, however be so soft that if the doors are closed on the test bar mentioned in paragraph 7.6.5.6.1.1. the rigid structure of the doors will reach the fully closed position.**~~

7.6.5.7. **Where a powered operated service door is held closed only by the continued application of the power supply there shall be provided a visual warning device to inform the driver of any failure of the power supply to the doors**

Wrightbus Comments ;

Open Platform – The open platform utilizes a manual service door in the locked open position. When in the closed position the 'door' will function as a power operated service door and the necessary tell tales will be provided.

Powered Door – Complies. All necessary tell tales and equipment will be fitted to comply.

7.6.5.8. **A starting prevention device, if fitted, shall be effective only at speeds of less than 5km/h and shall be incapable of operation above that speed.**

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position. No starting prevention device will be fitted in this mode.

Powered Door – Complies. As with the centre door arrangement on current vehicles supplied to London, there will be links between handbrake, partial brakes, door conditions and vehicle speed to ensure that that the rear powered service door will operate as required by this paragraph.

7.6.5.9. **If the vehicle is not fitted with a starting prevention device, an audible warning to the driver shall be activated if the vehicle is driven away from rest when any power operated service door is not fully closed. This audible warning shall be activated at a speed exceeding 5km/h for doors complying with the requirements of paragraph 7.6.5.6.1.2.3.**

Wrightbus Comments ;

Open Platform – Not applicable as the open platform utilizes a manual service door in the locked open position. No starting prevention device will be fitted in this mode and no audible warning will be provided to the driver, however as noted earlier, the vehicle may include a visual identification to the driver to remind him that the vehicle is operating in the 'open platform' mode.

Powered Door – Complies. As with the centre door arrangement on current vehicles supplied to London, there will be an audible warning to notify the driver of this condition.

Summary

In our opinion it is possible for both modes to comply with the requirements of the regulation when assessed individually. The issue regarding compliance appears to centre around the operation

modes of the vehicle and the fact that at times it is the desire to call the rear platform a ‘manual service door’ or ‘aperture’ and at other times classify the rear door as a ‘powered service door’. There may be reason why a manual door (with the power isolated) is still classed as a power operated door and this may be one of the areas on which clarify is required. We cannot see anything which indicates that two modes are not permitted and references to ‘normal conditions of use’ and ‘normal conditions of travel’ do not, in our opinion invalidate our proposal. It could be possible that the interpretation of these terms implies that the vehicles can only have one normal condition of travel, however we would view this as subjective. It also states that measurements shall be made when the vehicle is at its mass in running order and it is standing on a smooth and horizontal ground surface and in its normal condition of travel. Again, the reference is to measurements only so should not impact on the operational modes contained within our proposal, providing we produce arrangements that dimensionally comply with the requirements for each of the modes.

NSSTA – National Small Series Type Approval

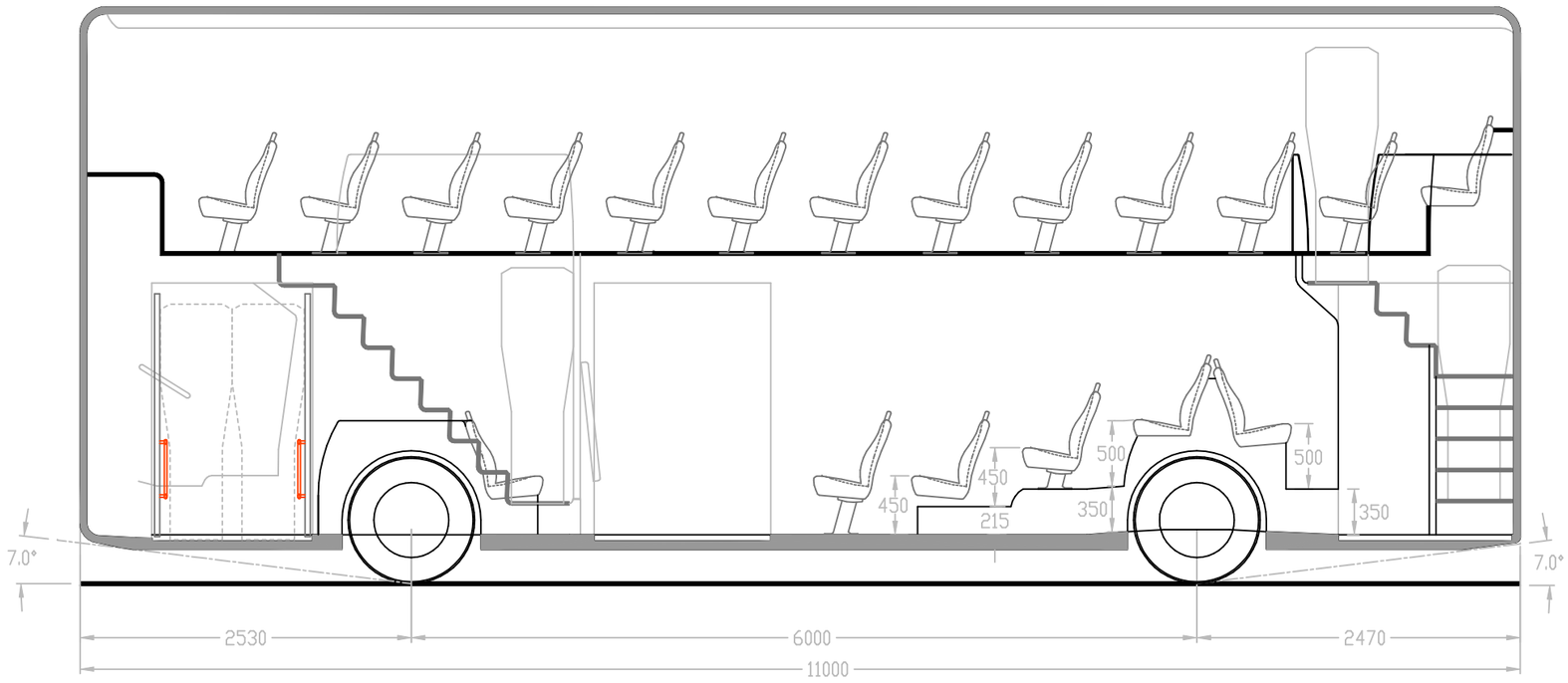
If the operational and technical requirements of the two modes are individually deemed to comply with the requirements of ECE Reg.107, but it is deemed that collectively they do not meet the requirements when viewed together (i.e. it is not possible to have an aperture with a manual door and at other times a power operated door) it may be a option to consider offering a alternative interpretation under the NSSTA scheme. This route may permit the VCA to offer a dispensation to permit both modes to be operable on the vehicle at different times of the operational day. If the two modes are individually acceptable (i.e. if one of each mode was fitted on two separate vehicles) and comply with the technical, safety and environmental protection issues contained within the Regulation(s) or other national requirements then there should be no additional risk to permit the vehicle to operate in different conditions at different times. Wrightbus would like the DfT, VCA and VOSA to note that we are not experts in this area and we offer this information so that this route can be more accurately assessed by the National Approval Authority as a potential option.

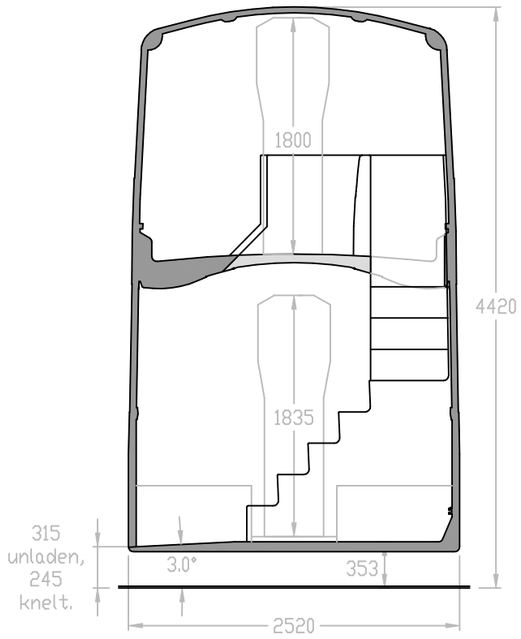
Disclaimer

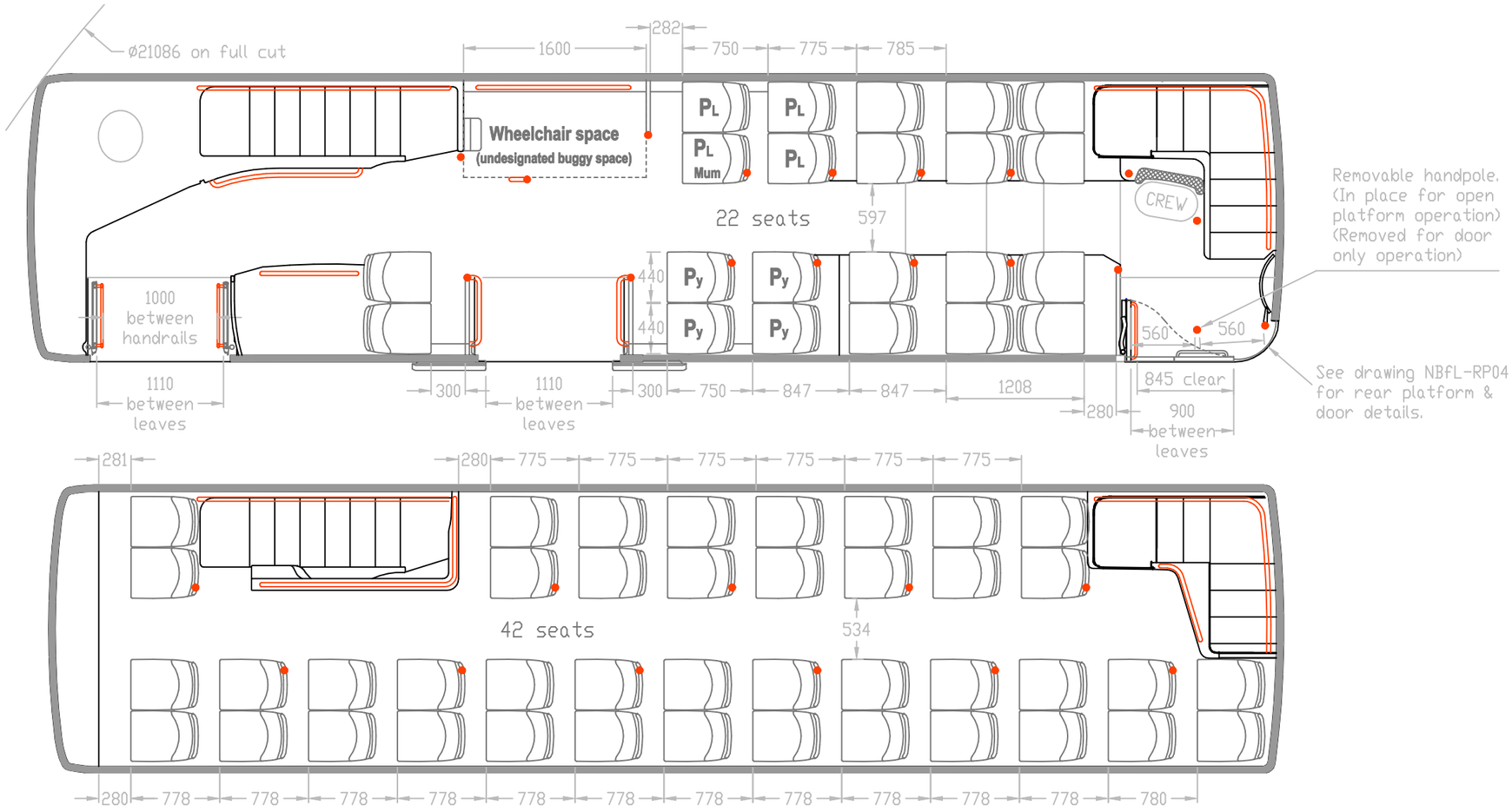
The information contained within this report is the view of Wrightbus, who is the designated manufacturer for the new project. Although knowledgeable about the topic we do not believe that we are as well informed as the VCA, DfT and VOSA on these matters so any inaccuracies in the report are unintentional and are not included to confuse or mislead.

Appendix B

Drawing Pack







NBfL-008

Front & rear staircase

Spec compliance:-

Min 22 seats downstairs	yes
Min 41 seats upstairs	yes
4 Priority seats	yes
4 Preferential seats	yes
1600mm wheelchair space	yes
1100mm between front door leaves	yes
1100mm between mid door leaves	yes
Approach & depart angles between 7 & 8°	yes
Space on lower deck for 24 standees	yes
Seat pitches between 750 & 800mm	yes
Min. 8 seats on low flat floor area	yes
Better than worst case turn circ. of 21814mm	yes

All dimensions are nominal and subject to change

Uncontrolled Document

Drawn by S.McC 11.11.09

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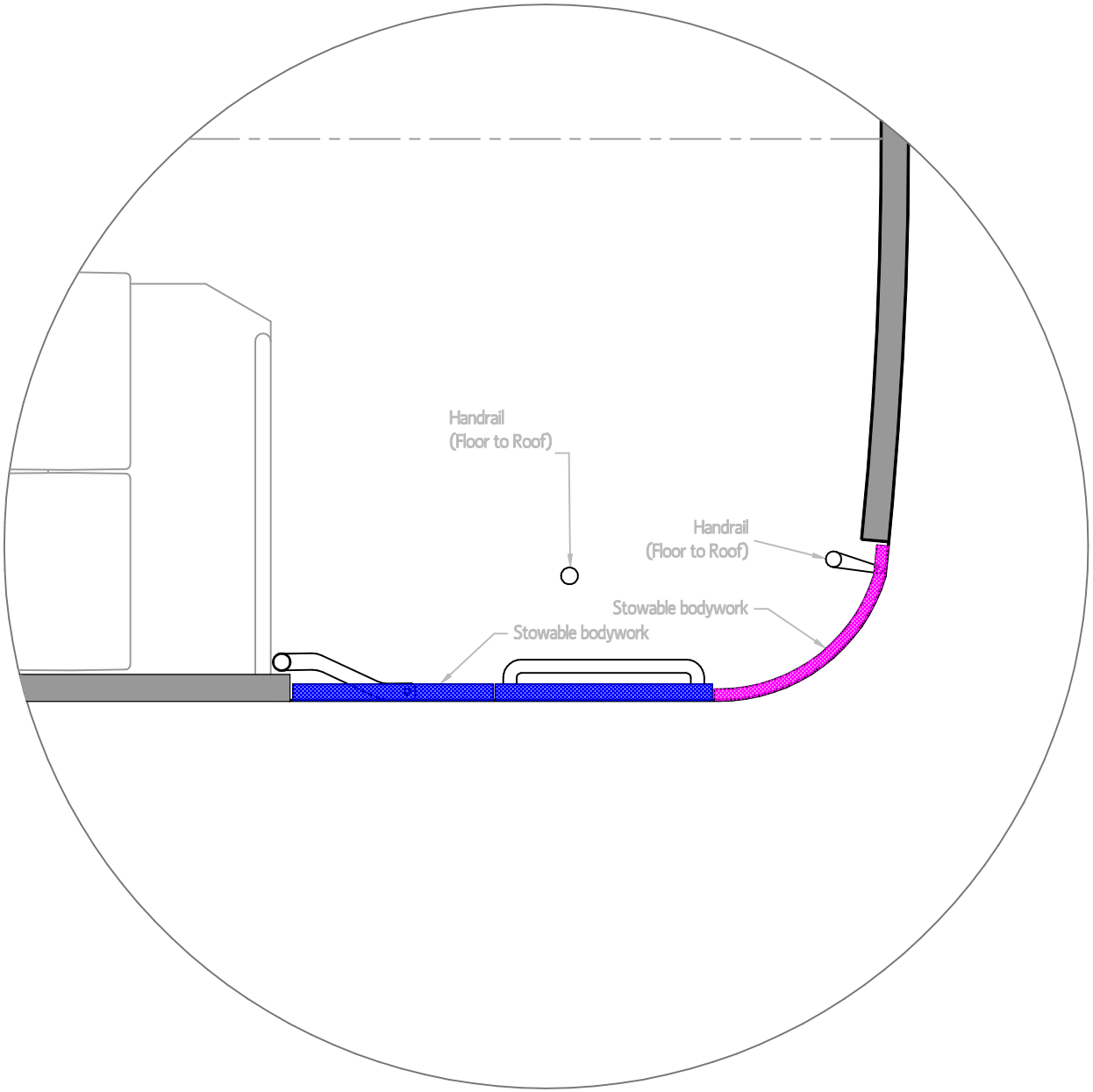
A NEW BUS FOR LONDON

Powered Hinging Panels to front, manual panel to rear



NBfL-RP006 closed

Spec Ref. 9.01 - Open platform
Stowable bodywork with door

Spec compliance:-

Rear open platform	yes
Stowable bodywork to close off platform	yes
Close off platform within 5 minutes	yes
Close off platform with 1 or 2 crew members	yes
Close off platform away from depot	yes
No entry or exit is Evident when closed	yes
Bodywork remains stowed when bus in motion	yes
No emergency release required	yes
Bodywork fully & completely out of sight	yes^
Enclosures integral with fixed bodywork	yes^
Compliant with legislative requirements	tbc*
Compliant with certification	tbc*
Compliant with operational requirements	yes

^Will comply as necessary

*Pending DFT approval

All dimensions are nominal and subject to change

Uncontrolled Document

Drawn by S.McC. 11.01.10

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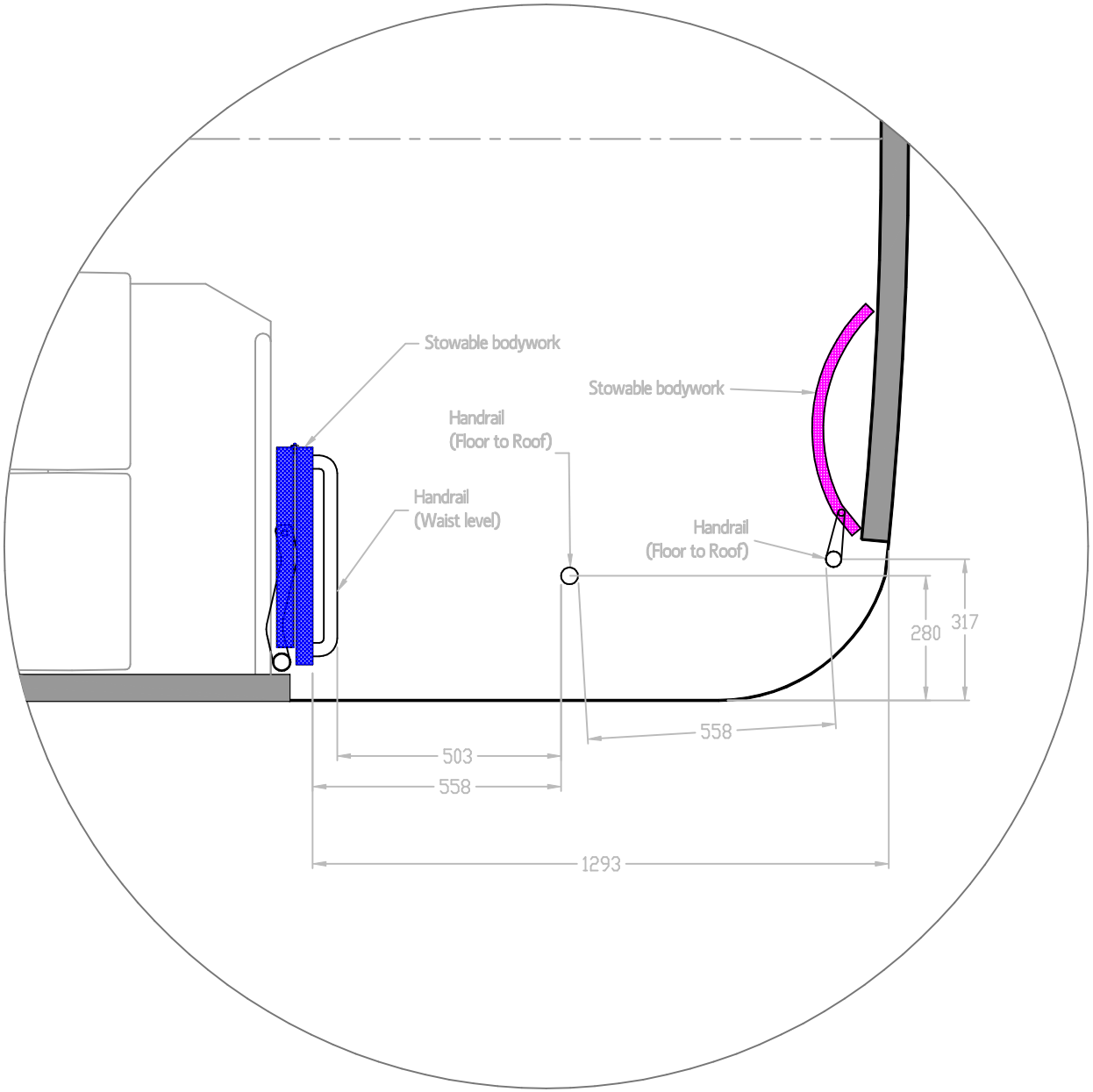

NBfL-RP006 open

Spec Ref. 9.01 - Open platform
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Spec compliance:-

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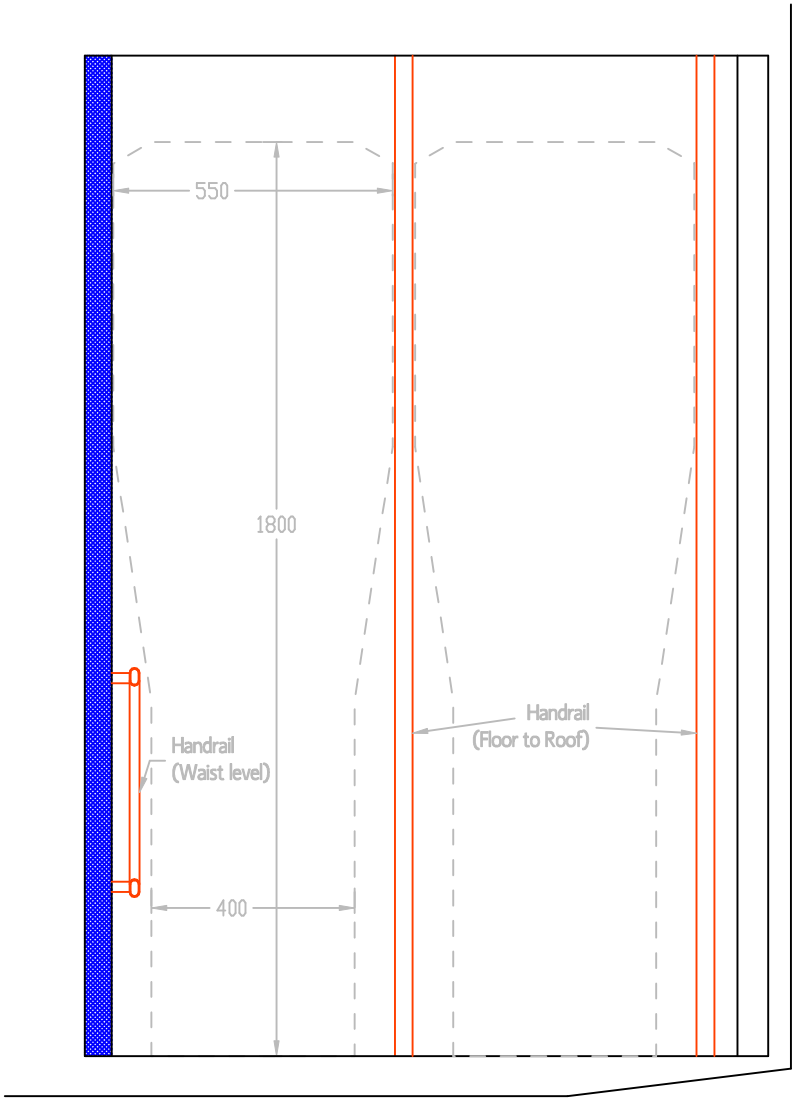

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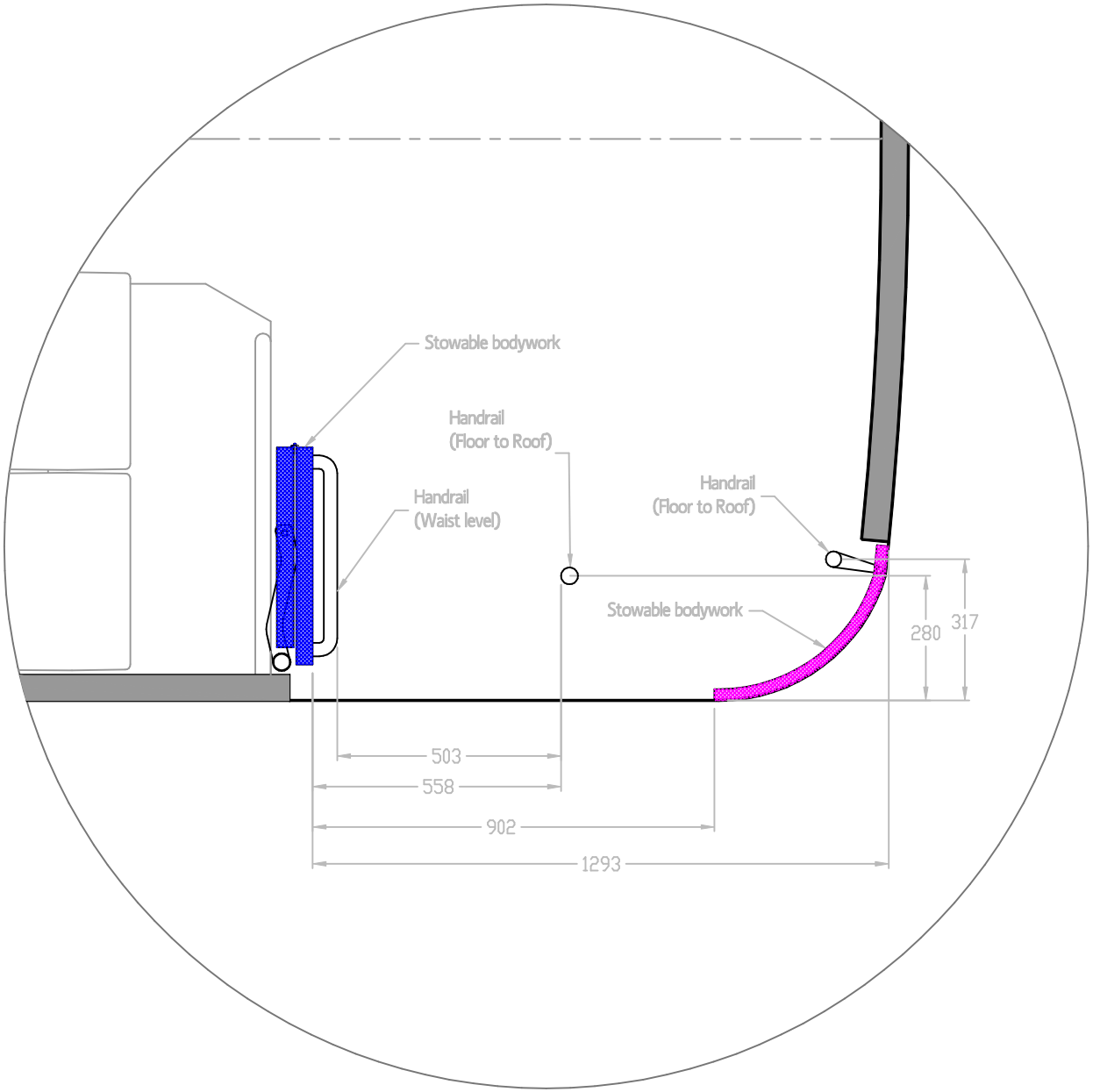

NBfL-RP006 door open

Spec Ref. 9.01 - Open platform
Stowable bodywork with door

Spec compliance:-

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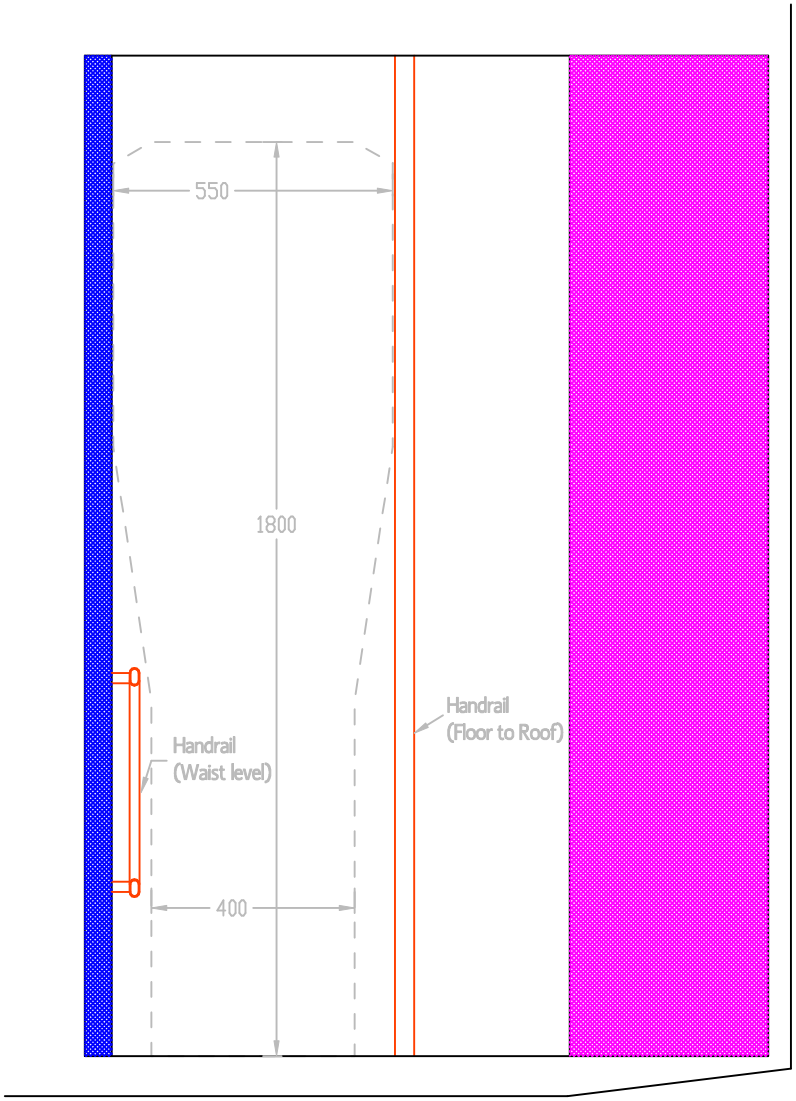

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